EFFECT OF NURSING INTERVENTIONAL PACKAGE ON OSTEOPOROTIC RISK REDUCTION AND QUALITY OF LIFE AMONG SENIOR CITIZENS RESIDING IN SELECTED OLDAGE HOMES IN CHENNAI

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ABSTRACT

BACKGROUND: Osteoporosis is a significant health concern among the elderly, leading to fractures, reduced mobility, and impaired quality of life (QOL). Tai Chi Therapy is a gentle exercise combining slow movements, balance, and deep breathing, ideal for older adults. It improves stability, coordination, and reduces fall risk Activities like walking and cycling promote cardiovascular health and endurance,benefiting those at risk of osteoporosis

OBJECTIVES: This study evaluates the effectiveness of a Nursing Interventional Package (NIP) on osteoporosis risk reduction, biochemical parameters, and QoL among senior citizens residing in selected old age homes in Chennai.

METHODS: A quasi-experimental pre-test and post-test design was employed, involving 80 participants aged 65–85. The NIP included low-intensity aerobic exercises, deep breathing exercises, Tai Chi therapy, and dietary calcium supplementation.

RESULTS: The Findings revealed a significant improvement in QOL scores, with an overall gain of 29.04% across physical, psychological, social, and environmental domains ($p = 0.001$). Serum calcium levels increased by 0.71 mg/dL, with 84.62% achieving normal levels post-intervention. Bone Mineral Density (BMD) showed marked improvements, with osteoporosis prevalence dropping from 44.87% to 23.08%. Correlation analysis indicated a moderate positive relationship between QOL improvements and BMD reduction ($r = 0.42$, $p = 0.001$) as well as serum calcium levels ($r = 0.39$, $p = 0.01$). Demographic factors such as previous occupation, education, duration of stay, and dietary habits significantly influenced outcomes ($p < 0.05$). A high satisfaction rate (96.25%) was reported among participants, indicating strong acceptance of the intervention.

CONCLUSION: The study concludes that a structured Nursing Interventional Package effectively enhances bone health, improves QoL, and reduces osteoporosis risk among senior citizens. These findings emphasize the need for integrating such interventions into routine elderly care to promote healthier aging.

KEYWORDS:

Osteoporosis, Quality of Life, Bone Mineral Density, Nursing Interventional Package, Elderly, Senior Citizens, Tai Chi, Aerobic Exercise, Biochemical Parameters

CHAPTER-I

INTRODUCTION

"Osteoporosis affects more than bones—it takes away your freedom and quality of life."

1.1 Background of the study

Osteoporosis is a condition that weakens bones, making them brittle and prone to fractures, especially in the hip, wrist, and spine. It occurs when bone loss outpaces new bone formation. It is more common in older adults. In India, studies show that 80% of women and 50% of men have low bone mass, with osteoporosis affecting 73.9% of women and 26.2% of men over 60 [1]. Tai Chi Therapy is a gentle exercise combining slow movements, balance, and deep breathing, ideal for older adults. It improves stability, coordination, and reduces fall risk [3].Low-Intensity Aerobic Exercise helps maintain bone density, strengthen muscles, and improve balance, minimizing fall risk[3]. Activities like walking and cycling promote cardiovascular health and endurance, benefiting those at risk of osteoporosis [4.]

1.2 Need for the study

Mesas et al. (2009) conducted a study in Spain with 3,708 older adults, finding that 38.4% had IADL limitations. Participants sleeping ≤5 or ≥10 hours had higher odds of limitations compared to those sleeping 8 hours [5]. After adjusting for comorbidities, only long sleep (≥10 hours) remained a significant predictor of functional limitations.Sharma and Khandelwal (2010) assessed osteoporosis risk tools in 536 Indian postmenopausal women. A self-administered risk score showed 78.33% sensitivity and 27.12% specificity [6]. The risk score inversely correlated with BMD, while BMI showed a positive correlation. The study emphasized early, cost-effective osteoporosis detection in developing countries to reduce the need for expensive tests.

1.3 Statement of the study

Effect of Nursing Interventional Package on osteoporotic risk reduction and quality of life among senior citizens residing in selected oldage homes in Chennai.

1.4 Aim of the study

To evaluate the effectiveness of Nursing Interventional package on osteoporotic risk reduction, quality of life and related biochemical parameters among senior citizens.

1.5 Objectives

Primary Objectives;

1. To assess the level of osteoporosis risk and quality of life among senior citizens residing in selected old age homes before and after implementing Nursing intervention package.
2. To evaluate the effectiveness of Nursing International Package on osteoporosis risk reduction and related biochemical parameter and quality of life among senior citizens

Secondary objectives:

3. To estimate the prevalence of osteoporosis risk among senior citizens residing in selected old age home.
4. To find out the correlation between osteoporosis risk reduction and quality of life among senior citizens.
5. To find out the association between selected demographic variables and osteoporosis risk reduction and quality of life among senior citizens residing in selected old age home.
6. To assess the satisfaction level among senior citizens residing in selected old age homes after implementing the Nursing Interventional Package

1.6 Research Hypothesis

- HI:There is a significant difference in the level of osteoporotic risk reduction and biochemical parameters before and after implementing the Nursing Interventional Package among senior citizens.
- H2: There is a significant relationship in the level of Quality of life among senior citizens before and after implementing the Nursing Interventional

Package.

1.7 Study variables

The study includes the following variables:

- Dependent Variable - Osteoporotic risk reduction and quality of life
- Independent Variable - Nursing Interventional Package

1.8 Operational definition :

Effect: It refers to the outcome of nursing intervention therapy on osteoporotic risk reduction and the quality of life among senior citizens residing in selected older age home which is measured by using the standardized tool of Osteoporotic risk reduction assessment instrument (ORAI) & quality of Life by WHO BREF scale

Nursing Interventional Package: It refers to the following therapies as

A.Low-intensity aerobic Exercises: It is the presence of oxygen any activity that allows oxygen to release energy through metabolism and that is performed at a low intensity like warm up, deep breathing exercises, (Stretching exercises- ankle & knee exercises, Quadriceps & Hamstring exercises. The steps of Low Intensity Aerobic Exercises:1. Warm up & Cool down 2.Stretching exercises (Ankle and Knee Stretch, Stretching exercises) 3.Walking Exercises (Where they will get expose to VIT D through Sunlight)

B.Deep breathing Exercises: It is intended to promote effective and healthy breathing and breath control,It refers to an exercise where the person inhale slowly through the nose, focusing on the breathe and Count in the mind 1-2-3-4-5and then exhale through the mouth counting 1-2-3-4-5.-6-7-8 as all the air leaves your lungs.

C.Video-assisted Teaching on Taichi Therapy :Video Teaching on Taichi for prevention of osteoporosis:This program builds strength, and improves balance and health. It can slow down the thinning of bones and reduce the risk of falls.

Osteoporotic risk reduction: It refers to the tool reduction of Osteoporotic risk among the senior citizens residing in the old age which is elicited by ORAI, BMD and Biochemical Parameters.**ORAI:** It refers to a tool that is used to assess the risk for osteoporosis among senior citizens.It comprises of following parameters (1) age in years, (2) weight in kilograms & (3) current estrogen use (If any)

Quality of life :It refers to the level of life satisfaction experienced by senior citizens in old age homes across physical, social, environmental, and spiritual domains. Scores are calculated by summing domain-specific points and converting them to a 0-100 scale. Higher scores indicate better QOL.This 100 we can consider has follows:

Table-1.1: Level of WHO BREF QOLScoring and Interpretation	
If **Score Value is < 50**	**Poor Quality of Life**
If **Score value is between 51-75**	**Moderate Quality of Life**
If **Score Value is >75**	**Good QOL score**

Measurement of BMD:

It refers to the measurement of bone density of wrists and ankles. Bone density is measured using a portable BMD device

Biochemical Parameter measurement:

It refers to monitoring of Serum Calcium level

Table-1.2:Scoring and Interpretation		
1	Normal calcium level	9.3 to 9.9 mg/d
2	Mild calcium level	8.1 to 9.0 mg/dL
3	Moderate calcium level	6.5 -8.0 mg/dL
4	Severe calcium level	less than6.4 mg/dL

Senior citizens: It refers to male or female senior citizens who are between the age group of 60-85 years residing in the selected old age home.

Oldage home: It refers to a residential old age home or a structured building where senior citizens of male and female persons between the age group of 60-85 years stay on payment.

1.9 Assumptions

- The nursing intervention package, including activities such as low-intensity aerobic exercises, deep breathing exercises, and Tai Chi therapy, is administered consistently and accurately to all senior citizens.
- The senior citizens involved in the study are physically and mentally capable of adhering to the intervention program.

1.10 Delimitations

- The study was delimited in the following ways:

- Senior citizens who are in the age group of 65-85 years and residing at old age homes
- Senior citizens who have ORAI scores more than 9 and advised for Bone densitometry test

1.11CONCEPTUAL FRAMEWORK

The study was designed based on the Conceptual Framework Based on Ernestine Wiedenbach's Helping Art of Clinical Nursing Theory

1.12: Summary

This chapter introduces the research study, covering the background and rationale for conducting the study. The chapter presents the need for the study, the statement of the problem, and the objectives. Additionally, it discusses the assumptions, hypotheses, and operational definitions of key terms used throughout the study.

CHAPTER-II
REVIEW OF LITERATURE

A literature review was conducted using databases like Web of Science, PubMed, and Scopus to explore osteoporosis prevalence and nursing interventions. The review is presented under key sections:

2.1 Overview of Osteoporosis and Its Prevalence

Osteoporosis weakens bones, increasing fracture risk. Globally, 1 in 3 women and 1 in 5 men over 50 experience fractures 7. In Asia, 15% of women and 5% of men in China and 38.4% of women in Japan are affected 8. It significantly reduces quality of life due to pain, limited mobility, and psychological distress.

ii) Literature related to Osteoporosis Among Older Adults:

Johnell et al. (2019) found a 29% prevalence of osteoporosis in women and 12% in men aged 65+, with low BMI and prior fractures as major predictors 9.

ii) Literature related to Quality of Life : Al-Obaidi et al. reported that 45% of elderly participants had poor quality of life, with chronic health conditions accounting for 60% of life satisfaction variance 10.

iii) **Literature related to Tai Chi for Balance and Fall Prevention :** Huang et al. reviewed 15 RCTs with 1,200 older adults and found Tai Chi significantly reduced fall rates (risk ratio = 0.60, $p < 0.001$) and improved balance (mean difference = 5.4, $p < 0.001$) 11.

iv) **Literature related to Low-Intensity Aerobic Exercises :**Smith et al. conducted a 12-week RCT with 180 participants, showing that low-intensity stretching exercises improved flexibility ($p < 0.01$) and balance ($p < 0.05$), reducing fall risk [12].

v) Literature related to Deep Breathing Exercises : Rivera et al. found that low-intensity stretching improved joint range of motion by 18% (ankle) and 15% (knee) in elderly men, enhancing mobility ($p < 0.05$) [13].

vi) Literature related to Walking in Sunlight: Zhang et al. reported significant improvements in mental health (GDS scores ↓30%, $p < 0.01$) and physical function

(TUG times ↓5 seconds, $p < 0.05$) in older adults who walked outdoors for 30 minutes daily [14.]

\2.2 Research Gap

A research gap analysis in the Current research on osteoporosis management focuses on risk identification, Tai Chi, and physical activity but lacks a structured nursing intervention. To address this gap, the proposed study will incorporate on the Nursing Interventional Package includes Low-intensity aerobic exercises, deep breathing, Tai Chi, providing a holistic approach to osteoporosis prevention in seniors.

2.3 Summary

The study applies Wiedenbach's theory in a three-phase Nursing Interventional Package: risk identification, intervention (exercises, Tai Chi, walking, deep breathing), and validation after four months. The flexible framework ensures ongoing improvements in osteoporosis care and quality of life for elderly participants.

CHAPTER III

RESEARCH METHODOLOGY

This chapter outlines the methodology used to evaluate the effectiveness of a Nursing Interventional Package on osteoporotic risk reduction, quality of life, and biochemical parameters in senior citizens. It includes the research design, setting, sample, data collection, pilot study, and ethical considerations, presented in three phases: Phase I (Pre-test), Phase II (Intervention), and Phase III (Post-test).

3.1 Research Approach

A quantitative approach was used to collect and analyze numerical data. The one-group pre-test and post-test method evaluated the Nursing Interventional Package's effectiveness.

3.2 Research Design

A quasi-experimental design with one group pre-test and post-test was employed.

O1: Pre-test assessment of osteoporosis risk, serum calcium, and quality of life.

X: Administration of Nursing Interventions (Low-Intensity Exercises, Deep Breathing, and Video-Assisted Tai Chi and Wlking in the Sunlight).

O2: Post-test assessment of the same parameters.

3.3 Research Setting

The study was conducted at two old age homes in Chennai:

Old Age Home I: Visharanthi Old Age Home

Old Age Home II: Dr. Sharmila Retirement Centre

3.4 Population: The target population included senior citizens aged 65-85 years residing in old age homes in Chennai. The accessible population consisted of individuals willing to participate and meeting inclusion criteria.

3.5 Sample : The sample included **80** senior citizens (40 from each old age home I &II).

Table-3.1:Sampling Technique employed in the study

Stage	Sampling Method	Old Age Home-I	Old Age Home-II	Partici pants	Total
Stage 1	Multi-stage cluster random sampling	Visharanthi Old Age Home	Dr. Sharmila Retirement Centre	40	**80**
Stage 2	Simple random sampling (lottery method)	Visharanthi Old Age Home	Dr. Sharmila Retirement Centre	40	

Table 3. 2-Sample Size Calculation :

The sample size was calculated with power analysis i.e 95% confidence interval and 10 % absolute precision error.

Formula-n = 4pq / L2P=78, q=(lO0-p) Therefore q= (100-78=22), L-Precision Error n=Sample size

n = 4pq /L2

n = 4 x 78x 22 / 10

n= 6864 / 100

n= 68.64 Rounded to 70

n= 70 + Attrition 10%

n= 70 + 10

n=80

P-Prevalence

The sample size will be 80 with reference to this study by Venu R. Shah, Donald S. Christian

3.6 Inclusion Criteria

- Senior citizens who are in the age group of 65-85 years and residing at selected old age homes situated in Chennai
- Senior citizens who have ORAI score more than 9 and advised for Bone densitometry test Senior citizens who have poor quality of life
- Senior citizens who can understand and speak Tamil or English.
- Senior citizens both male and female residing at selected old age homes.

3.7 Exclusion Criteria

- Senior citizens who are seriously ill during the data collection period. Senior citizens who are diagnosed with osteoporosis
- Senior citizens who are not willing to participate. Senior citizens who cannot walk

- Senior citizens who are mentally and physically impaired. Senior citizens who have poor cognition
- Senior citizens who are deaf and dumb
- Senior citizens who are already doing any of these therapies regularly

3.8 Data Collection Instruments

The tool was developed and standardized through an extensive review of the literature and discussions with experts in the field. It was carefully designed to capture the relevant variables and measurements required for the study. The tool consists of two sections, each focusing on specific aspects of the research objectives. The development and standardization process ensured that the tool is reliable, valid, and capable of providing accurate data for the research study.

Description of data collection tool : The tool which is used in this study consists of Four Phase, P**hase:I** It has five parts such as A,B,C,D & E as follows

Part-A: Demographic data : Structured questionnaire will be used to collect the demographic data. It consists of age, sex, marital status, source of income, religion, previous occupation, educational status, duration of stay at old age home, reason for joining in old age home, hobbies and co-morbid illness.

Part-B:osteoporosis risk assessment instrument (1) age in years(2) weight in kilograms (3) current estrogen use.

Part-C: Quality of life assessment (WHO BREF Scale) : The WHO BREF QOL scale with 26 questions was used to assess quality of life. Scores were summed and transformed to a 0-100 scale, with higher scores indicating better QOL.

Table-3.2 ORAI - SCREENING TOOL

Age in years	**>=75**	**15**
	65-74	**9**
	55-64	**5**
	45-54	**0**
Weight in Kilograms	**<60**	**9**
	60-69	**3**
	>=70	**0**
Current oestrogen use	**NO**	**2**
	YES	0

Part-D: Biochemical Parameter Assessment: It refers to monitoring of calcium level : Normal calcium level - 9.3 to 9.9 mg/dl-_

Table-3.3 : WHO BREF QOL -SCORING AND INTERPRETATION

If Score Value is < 50	**Poor Quality of Life**
If Score value is between 51-75	**Moderate Quality of Life**
If Score Value is >75	**Good QOL score**

Table-1.2:Scoring and Interpretation

1	Normal calcium level	9.3 to 9.9 mg/d
2	Mild calcium level	8.1 to 9.0 mg/dL
3	Moderate calcium level	6.5 -8.0 mg/dL
4	Severe calcium level	less than6.4 mg/dL

Part-E : Measurement of BMD: It refers to the measurement of bone density of wrists and ankles. Bone density is measured using portable BMD device .

Table-3.5 : BMD - SCORING AND INTERPRETATION		
Category	**T-scores Range**	**Examples**
Normal Bone Density	**1.0 and above**	**0.9, 0 and -0.9.**
Low Bone Density(Osteopenia)	**-1 and -2.5**	**-1.1, -1.6 and -2.4.**
Osteoporosis	**2.5 and below**	**2.6, -3.3 and 3.9.**

3.9 : Data Collection schedule of the Pilot Study : A four-month pilot study at Ashirwad Old Age Home, Injambakkam, Chennai, assessed research feasibility. After obtaining Institutional Ethical Committee approval, 8 senior citizens were selected through cluster sampling, and informed consent was obtained. The pre-test was conducted on 6th and 7th June 2023, where each participant underwent a one-hour assessment, including demographic data collection, Osteoporosis Risk Assessment Index (ORAI), Bone Mineral Density (BMD) measurement, WHO BREF Quality of Life (QOL) scale, and serum calcium testing. The intervention phase spanned four months, incorporating daily therapies such as low-intensity aerobic exercises (15 minutes), deep breathing (5 minutes, three times a day), Tai Chi (20 minutes in the morning), and outdoor walking at 3 PM, with continuous follow-up. The post-test was conducted on 11th and 13th October 2023, reassessing QOL and serum calcium levels using the same tools.

Table-3.5: Data Collection schedule of the main study:

DATE	TYPE OF ACTIVITY	OLDAFE HOME –I TIME SCHEDULE	OLDAGE HOME -II TIME SCHEDULE	N
30-11-2023	PRE TEST	9.30 AM-5.00PM		78
11-12-2023	PRE TEST		9.30 AM-5.00 PM	
12-12-2023	BLOOD SAMPLE & B MD MEASUREMENT	9.30 AM-1.00PM	2.00 AM-5.00 PM	
14-12-2023	NURSING INTERVENTIONAL PACKAGE - TEACHING FOR BOT H OLDAGE HOMES	10.00 AM-12.00 N	1.00 AM - 6.00 PM	
01-04-2024	POST TEST	9.30 AM-5.00PM		
02-04-2024	POST TEST		9.30 AM-5.00 PM	
04-04-2024	BMD MEASUREMENT	9.00 AM-1.00PM	2.00pm-6.00 PM	
05-04-2024	BLOOD SAMPLE	10.00 AM-12.00 N	1.00pm-3.00 PM	

3.10: Validity of the tool The study was discussed in the research advisory committee and got approval. The suggestions were incorporated and later sent for validation . Later obtained the Content validity from the Nursing experts and

Medical experts.Suggestions given by the experts were incorporated in the main study.

3.11: Reliability of the tool

The instruments used in the study is more standardised and widely used in many researches. the tool was assessed by using Interrater method, cron bach alpha method. QOL score reliability correlation coefficient value is 0.83 (cron bach alpha method). Serum calcium score reliability correlation coefficient value is 0.89 (inter rater method). BMD score reliability correlation coefficient value is 0.90 (inter rater method). These correlation coefficients are very high and it is good tool for assessing effectiveness of nursing interventional package onosteoporotic risk reduction and quality of life among senior citizens.

3.12 :- Data Analysis:-

Descriptive statistics

- Frequency and percentage distribution was used to analyze the demographic variables.
- Mean and standard deviation was used to assess and compare the osteoporotic risk level assessment, Quality of life ,the Biochemical parameters (sr.calcium level) and BMD measurement.
- Correlation coefficient was used to assess the relationship between osteoporotic risk reduction, Quality of life ,the Biochemical parameters (sr.calcium level) and BMD measurement.

Inferential statistics

- Paired 't' test and Repeated measures ANOVA was used to assess and compare the pre and post-test osteoporotic risk assessment level, Quality of life ,the Biochemical parameters (sr.calcium level) and BMD measurement among senior citizens.
- Un-paired 't' test was used to assess the effectiveness of Nursing Interventional Package .
- Chi-square test was used to associate the mean osteoporotic risk level assessment, Quality of life , the Biochemical parameters (sr.calcium level) and BMD measurement with selected demographic variables.

3.13:Dropout Analysis :

Table-3.6 - Dropout Analysis:			
S.No	**Content**	**POST TEST**	
		n	**%**
	NO OF DROP OUTS	2	2.5
ANALYSIS OF THE DROP OUTS IN FREQUENCY AND PERCENTAGE			
REASONS		**NUMBER**	**%**
Left to Home town		01	1.25
Unable to Contact		01	1.25

3.14: Ethical Considération

The study was proposed in various Research Advisory Committee meetings and got revised. The study was also gone scrutinized for ethical concerns in the IEC/SSSMCRI/2021/710/IEC/Meeting No-40,Dated 29.06.2021) .Permission was obtained from the Visharanthi Old Age Home &Dr. Sharmila Retirement Centre. Participants were informed regarding the purpose of the study. Benefits were explained and Flexibility in withdrawal from the study was also ensured.

3.15 Summary

This chapter outlined the research approach, design, sampling, study instruments, ethical considerations, pilot study, data collection, and data analysis using descriptive and inferential statistics.

CHAPTER IV
ANALYSIS AND DATA INTERPRETATION

This chapter focuses on analyzing and interpreting the data collected to assess the Effectiveness of Nursing Interventional package on osteoporosis risk reduction and relatedbiochemical parameter and quality of life among senior citizens . The primary objective of this analysis is to condense the data into a manageable and interpretable format, allowing for the examination and testing of the research problem [2]. The collected data were organized, tabulated, and analyzed using both descriptive and inferential statistical techniques[3].

Organization of data

Data collected were organized under the following headings,

PART-I : Section A 4.1: Assess the level of osteoporosis risk and quality of life among senior citizens residing in selected old age homes before and after implementing the Nursing intervention package [4.]

Section B-4.2: Effectiveness of Nursing Interventional package on osteoporosis risk reduction and relatedbiochemical parameter and quality of life among senior citizens [5].

PART-II : Section A-4.3: Estimate the prevalence of osteoporosis risk among senior citizens residing in selectedold age home [6].

Section B-4.4: To find out the correlation between osteoporosis risk reduction and quality of life amongsenior citizens [7].

Section C-4.5 : To find out the association between selected demographic variables and osteoporosis risk reduction and quality of life among senior citizens residing in selected old age home [8].

Section C-4.6 : To assess the satisfaction level among senior citizens residing in selected old age homes after implementing the Nursing Intervention Package

Part-I : Section A-4.1-Objective 1: Assess the level of osteoporosis risk an quality of life among senior citizens residing inselected old age homes befo and after implementing the Nursing intervention package.

Table-4.1-Description of Demographic Variables

Demographic variables		No. of senior citizens (n=80)	%
Age	65-70 years	24	30.00%
	71-75 years	12	15.00%
	76-80 years	21	26.25%
	81-85 years	23	28.75%
Sex	Male	6	7.50%
	Female	74	92.50%
Marital status	Single	13	16.25%
	Married	2	2.50%
	Widowed	43	53.75%
	Divorced	8	10.00%
	Separated	14	17.50%
Source of financial	Old age pension from government	0	0.00%
	Support from children	18	22.50%
	Dependent on old age home	62	77.50%
Religion	Hindu	72	90.00%
	Christian	4	5.00%
	Muslim	4	5.00%
Previous occupation	Private	28	35.00%
	Government	5	6.25%
	Self employed	5	6.25%
	Nil	42	52.50%
EDUCATION STATUS	Illiterate	34	42.50%
	Literate	46	57.50%

Demographic variables		No. of senior citizens (n=80)	%
Duration of stay at old age home	Less than 1 year	13	16.25%
	1 to 3 years	14	17.50%
	More than 3 years	53	66.25%
Reason for joining in old age home	Voluntarily	23	28.75%
	Brought by children	29	36.25%
	Others	28	35.00%
Do you have any hobbies	Yes	44	55.00%
	No	36	45.00%
If yes	No	36	45.00%
	MU	2	2.50%
	RE	36	45.00%
	SM	3	3.75%
	TV	3	3.75%
Do you have any co-morbid illnesses?	Yes	39	48.75%
	No	41	51.25%
If yes	No	41	51.25%
	BD	1	1.25%
	BP	34	42.50%
	DM	4	5.00%
Do you any Intake history of Calcium/Vitamin D Supplements/Corticostero	Yes	19	23.75%
	No	61	76.25%
If yes	Nil	61	76.25%
	SHE	15	18.75%
	VIT	4	5.00%
Type of Dietary Pattern you follow	Vegetarian	26	32.50%
	Nonvegetarian	54	67.50%
Do you have any Family history of Osteoporosis	Yes	0	0.00%
	No	80	100.00%
Do you have ANY HISTORY OF FACTURE	Yes	11	13.75%
	No	69	86.25%
IF yes	No	69	86.25%
	BL	1	1.25%
	LH	4	5.00%
	LL	1	1.25%
	RH	1	1.25%
	RL	4	5.00%

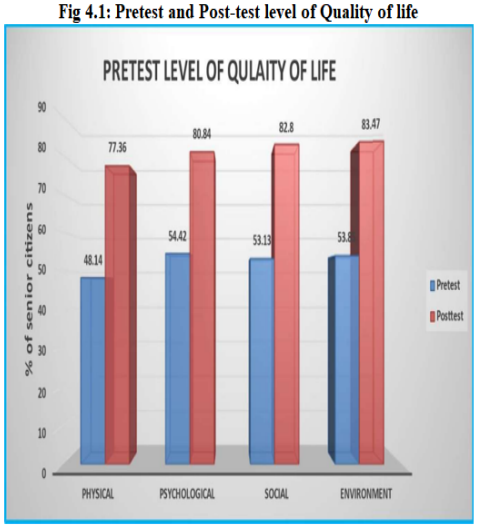
Table 4.1 presents a demographic analysis of 80 senior citizens, mostly aged 65–85 (84%) and female (92.5%). Over half (53.75%) are widowed, with 77.5% relying on old age homes. Hindus comprise 90%, and 52.5% had no formal occupation. Literacy stands at 57.5%, and 66.25% have lived in facilities for over three years. Key reasons for admission include family placement (36.25%) and voluntary admission (28.75%). Reading is a common hobby (55%). Nearly half (48.75%) have co-morbidities, mainly hypertension (42.5%). Most (67.5%) are non-vegetarian, and 23.75% take supplements. No osteoporosis family history was reported, but 13.75% had fractures, mostly in hips and legs. [19].

Table-4.2: Pretest and Post-test level of Quality of life

Table 4.2: Pretest and Post-test level of Quality of life

Domains	Group				Mean Difference	Student paired t-test
	Pretest		Post test			
	Mean	SD	Mean	SD		
Physical	48.14	7.39	77.36	6.43	29.22	t=28.91 p=0.001***(S)
Psychological	54.42	7.97	80.84	4.98	26.42	t=26.06 p=0.001***(S)
Social	53.13	10.27	82.8	4.34	29.67	t=23.70 p=0.001***(S)
Environment	53.85	10.47	83.47	6.34	29.62	t=21.90 p=0.001***(S)
Average	52.38	5.98	81.12	3.29	28.74	t=40.50 p=0.001***(S)

Fig 4.1: Pretest and Post-test level of Quality of life



S-Significant, NS – Not significant

Above table 4.2, shows a comparison of pretest and posttest scores in four well-being domains: physical, psychological, social, and environmental, along with the overall average. All domains showed significant improvement after the intervention. The physical domain increased from 48.14 to 77.36 (mean difference: 29.22), the psychological domain rose from 54.42 to 80.84 (mean difference: 26.42), the social domain improved from 53.13 to 82.80 (mean difference: 29.67), and the environmental domain increased from 53.80 to 83.40 (mean difference: 29.62). Overall, the average score rose from 52.38 to 81.12, with a mean difference of 28.74. Paired t-tests showed highly significant improvements across all domains ($p = 0.001$), confirming the intervention's positive impact on participants' well-being.

4.3 Pretest Level of QOL

The pretest assessment of 78 senior citizens showed that 41.03% (32) had poor quality of life, while 58.97% (46) had a moderate quality of life. None were classified as having a good quality of life. This highlights the need for interventions to improve their well-being.

Table-4.4: Pretest Level of Serum Calcium score

	Level of calcium	Number of senior citizens	%
1	Normal	47	60.26 %
2	Mild	31	39.74 %
3	Moderate	0	0.00%
4	Severe	0	0.00%
	Total	78	100.0%

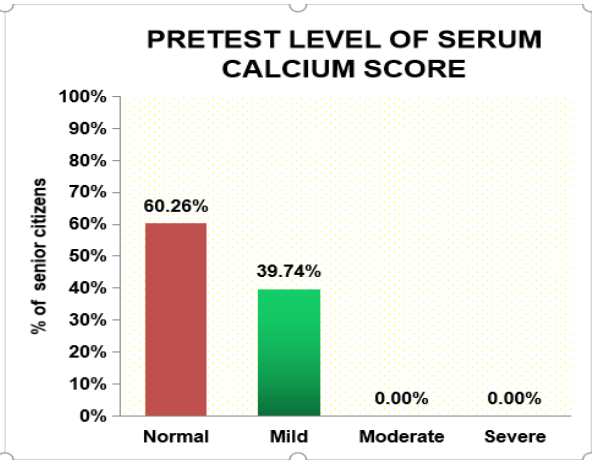


Fig-4.2: Pretest Level of Serum Calcium Score

Above table 4.4,Among 78 senior citizens, 60.26% (47) had normal calcium levels, while 39.74% (31) had mild deficiencies. No cases of moderate or severe deficiencies were found, indicating generally stable calcium levels with some mild deficiencies.

Table-4.5: Pretest Level of Serum Calcium Score

Table 4.5: Pretest Level of Serum Calcium Score

Assessment	Pre-test		Post-test		Mean difference	Student paired t-test
	Mean	SD	Mean	SD		
Serum calcium	9.16	0.42	9.87	0.68	0.71	t=10.20 p=0.001*** (S)

S-Significant, NS – Not significant

Above table 4.5, Serum calcium levels significantly increased after the intervention, rising from a mean of 9.16 (SD = 0.42) to 9.87 (SD = 0.68), with a mean difference of 0.71. A paired t-test (t = 10.20, p = 0.001) confirmed the increase was statistically significant, indicating the intervention's positive impact.

Table-4.6: Pretest Level of BMD Score

Table-4.6: Pretest Level of BMD Score

S.NO	Level of BMD	Number of senior citizens	%
1	Normal Bone Density	6	7.69%
2	Low Bone Density	37	47.44%
3	Osteoporosis	35	44.87%
	Total	78	100.00%

Above table 4.6 ,Among 78 senior citizens, only 7.69% (6) had normal bone density. A significant portion, 47.44% (37), had low bone density, and 44.87% (35) were diagnosed with osteoporosis. These findings indicate that most seniors have compromised bone health, with nearly half at high risk for fractures due to osteoporosis.

Part-I : Section B-4.2-Objective:2:To evaluate the effectiveness of the Nursing Interventional package on osteoporosis risk reduction and related biochemical parameter and quality of life among senior citizens

Table-4.7: Pretest and Posttest Level of QOL Score

Table-4.7: Pretest and Posttest Level of QOL Score

level	Pretest		Posttest		McNemar's test (Non Paramartic or what)
	n	%	n	%	
Poor	32	41.03%	0	0.00%	2=65.80 P=0.001***(S)
Moderate	46	58.97%	15	19.23%	
Good	0	0.00%	63	80.77%	
Total	78	100.00%	78	100.00%	

S-Significant, NS – Not significant

Above table 4.7, the study results demonstrate a significant improvement in participant performance from the pretest to the post test ,as analyzed McNemar's Test. Intially ,41.03% of participants were classified as having "Poor" performance, with 58.97% falling into the "Moderate" category, and none in the "Good" category. After the intervention, there were no participants in the "Poor" category, while 19.23% remained "Moderate," and a substantial 80.77% to category moved to the Good category .Mc Nemar's test Yoelded chi-

square value of 65.80 with a p-value of 0.001, indicating a highly significant improvement inoutcomes after the intervention.

Table-4.8: Pretest and Posttest QOL Score

Table-4.8: Pretest and Posttest QOL Score

Assessment	Pre-test		Post-test		Mean difference	Student paired t- test
	Mean	SD	Mean	SD		
QOL score	52.38	5.98	81.12	3.29	28.74	t=40.50 p=0.001***(S)

S-Significant, NS – Not significant

Above table 4.8 ,Shows that QOL score improved significantly from a pre-test mean of 52.38 (SD = 5.98) to 81.12 (SD = 3.29) post-test, with a mean difference of 28.74. A paired t-test (t = 40.50, p = 0.001) confirmed the improvement as highly significant, indicating a positive impact of the intervention.

Table - 4.9 : Effectiveness of Nursing Interventional Package on Qulaity of life gain score

Table - 4.9 : Effectiveness of Nursing Interventional Package on Qulaity of life gain score

DOMAINS	ASSESSMENTS	MAX SCORE	MEAN SCORE	%MEAN SCORE	PERCENTAGE OF QOL GAIN SCORE
Physical	Pretest	100	48.14	48.14%	29.22%
	Posttest	100	77.36	77.36%	
Psychological	Pretest	100	54.42	54.42%	35.42%
	Posttest	100	89.84	89.84%	
Social	Pretest	100	53.13	53.13%	29.67%
	Posttest	100	82.8	82.80%	
Environment	Pretest	100	53.85	53.85%	29.62%
	Posttest	100	83.47	82.47%	
OVERALL	Pretest	100	52.38	52.38%	29.04%

Above table 4.9,The QOL assessment showed significant improvements across all domains. The physical domain increased by 29.22% (48.14% to 77.36%), psychological by 35.42% (54.42% to 89.84%), social by 29.67% (53.13% to 82.80%), and environmental by 29.62% (53.85% to 83.47%). Overall, QOL scores rose by 29.04%, indicating substantial improvement after the intervention

Table 4.10: Posttest Serum Calcium Level score

Table 4.10: Posttest Serum Calcium Level score

S.no	Serum calcium level	Number of senior citizens	%
1	Normal	68	**84.62%**
2	Mild	12	**13.38%**
3	Moderate	0	**0.00%**
4	Severe	0	**0.00%**
	Total	**78**	**100.00%**

Above table 4.10,Among 78 seniors, 84.62% (68) had normal calcium levels, while 15.38% (12) had mild deficiencies. No moderate or severe cases were noted, indicating most seniors have adequate calcium levels, reducing osteoporosis risk.

Table 4.11: Comparison Of Pretest And Posttest Level Of Serum Calcium Score

Table 4.11: Comparison Of Pretest And Posttest Level Of Serum Calcium Score

S.no	Serum calcium level	Pretest		Posttest		McNemars test χ
		n	%	n	%	
1	Normal	47	60.26%	68	84.62%	**2=17.19**
2	Mild	31	39.74%	12	15.38%	**p=0.001***(s)**
3	Moderate	0	0.00%	0	0.00%	
4	Severe	0	0.00%	0	0.00%	
	Total	78	100.00%	78	100.00%	

S-Significant, NS – Not significant

Above table 4.11,The table shows serum calcium levels in 78 participants Pre- and post-intervention. Normal levels increased from 60.26% to 84.62%, while mild deficiency dropped from 39.74% to 15.38%. No moderate or severe deficiencies were found. A t-value of 17.19 (p = 0.001) confirmed a significant impact on calcium normalization

Table 4.12: Effectiveness of Nursing Interventional Package And SerumCalcium Gain Score

Table 4.12: Effectiveness Of Nursing Interventional Package And Serum Calcium Gain Score

Assessments	Baseline score	Mean calcium score	Percentage of the mean difference score	Percentage difference from baseline of calcium gain score
Pretest	9.16	9.16	0	7.75%

S-Significant, NS – Not significant

Above table 4.12,The pretest calcium score was 9.16, with no change from baseline. Post-intervention, it increased to 9.87, showing a 0.71 mean difference and a 7.75% improvement, indicating positive calcium level gains.

Table 4.13: Pre Test and Post Test BMD

Table 4.13: Pretest And Posttest Bmd

Assessment	Pre-test		Post-test		Mean Difference	Student Paired t-test
	Mean	SD	Mean	SD		
BMD	-1.99	0.88	-1.23	1.11	-0.77	t=5.13 (p=0.001*** (S)

S-Significant, NS – Not significant

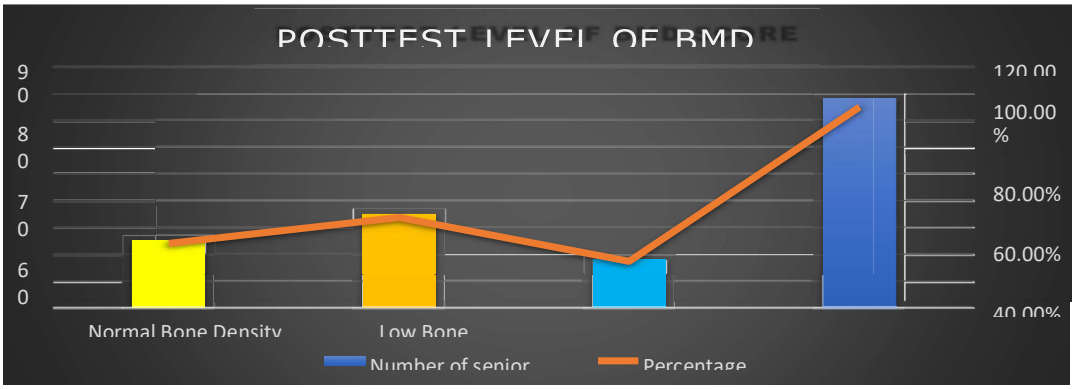
Above table 4.13,The paired t-test showed a 0.77-unit increase in BMD post-intervention (p = 0.001), indicating a significant positive impact on bone health and effectiveness in reducing bone loss.

Table 4.14: Posttest Level Of BMD Score

Table 4.14: Posttest Level Of Bmd Score

S.NO	Post Level of BMD Score	Number of senior citizens	Percentage (%)
1	Normal Bone Density	25	32.05%
2	Low Bone Density	35	44.87%
3	Osteoporosis	18	23.08%
	Total	78	100.00%

Fig.-4.4: Posttest Level Of BMD Score



Above table 4.14,Post-intervention, 35 participants had normal calcium levels, up from 25 pretest, while mild deficiency cases dropped to 18. No moderate or severe deficiencies were recorded, showing a notable improvement in calcium status

Table 4.15: Comparison Of Pretest and Post test Level of BMD Score

Table 4.15: Comparison Of Pretest And Posttest Level Of BMD Score

S.NO	BMD level	Pretest		Posttest		McNemars test
		n	%	n	%	
1	Normal bone Density	6	7.69%	25	32.05%	x 2=20.25 p=0.001***(s)
2	Low Bone density	37	47.44%	35	44.87%	
3	Osteoprosis	35	44.87%	18	23.08%	
	Total	**78**	**100.00%**	**78**	**100.00%**	

S-Significant, NS – Not significant

Above table 4.15,BMD levels improved significantly post-intervention. Normal BMD increased from 7.69% to 32.05%, while osteoporosis cases dropped from 44.87% to 23.08%. Low BMD saw a slight decrease from 47.44% to 44.87%. The chi-square value of 20.25 (p = 0.001) confirmed the changes were statistically significant, indicating the intervention effectively improved bone health and reduced osteoporosis risk.

Table 4.16: Effectiveness Of Nursing Interventional Packages And BMD Gain Score

Table 4.16: Effectiveness Of Nursing Interventional Packages And BMD Gain Score

Assessments	Baseline score	Mean BMD	Mean BMD difference score	Percentage difference from baseline of BMD score
Pretest	-1.996	-1.996	0	38.58%
Pretest		-1.226	-0.77	

Above table 4.16,BMD improved from a pretest mean of -1.996 to -1.226 post-intervention, showing a 0.77 gain and a 38.58% improvement. This highlights the intervention's effectiveness in enhancing bone health and reducing osteoporosis risk.

Part-II : Section A - 4.3 - Objective 3:Estimate the prevalence of osteoporosis risk among senior citizens residing in selectedold age home

Table-4.17 :Level of Osteoprosis Risk Score

Table 4.17 shows the score distribution among 78 senior citizens. About 32.05% (25) scored 20, while 67.95% (43) scored 26, indicating a majority in the higher category.

LEVEL OF OSTEOPROSIS RISK score	Senior Citizens	
	n	%
20	25	32.05%
26	43	67.95%
Total	78	100.00%

Part-II : Section B-4.4Objective 4 :To find out the correlation between osteoporosis risk reduction and quality of life among senior citizens.

Table4. 18 : Correlation between Qol Gain Score, Serum Calcium Gain Score

Table4. 18 : Correlation Between Qol Gain Score, Serum Calcium Gain Score

Correlation between	Mean gain score Mean±SE	Karl pearson Correlation coefficients	Interpretation
QOL gain score Vs serum calcium gain score	28.73±0.71 0.41±0.07	r= 0.44 P=0.001***(S)	There is a significant positive fair correlation between QOL gain score and calcium gain score. It means calcium increases their osteoporosis risk reduced there by QOL score also increases fairly

S-Significant, NS – Not significant

Above table 4.18,The findings show a positive correlation (r = 0.44, p = 0.001) between QOL improvement (mean gain: 28.73) and serum calcium levels (mean gain: 0.1). This suggests that higher calcium levels may enhance overall quality of life in elderly participants.

Table 4.19: Correlation Between Qol Gain Score And Bmd ReductionScore

Table 4.19: Correlation Between Qol Gain Score And Bmd Reduction Score

Correlation between	Mean gain score Mean±SE	Karl pearson Correlation coefficients	Interpretation
QOL gain score Vs BMD reduction score	28.73±0.71 -0.77±0.15	r= 0.42 P=0.001***(S)	There is a significant positive moderate correlation between QOL gain score and BMD reduction gain score. It means BMD reduction increases their QOL gain score

S-Significant, NS – Not significant

Above table 4.19, the analysis shows a moderate positive correlation (r = 0.42, p = 0.001) between QOL gain (28.73 ± 0.71) and BMD improvement (-0.77 ± 0.15). This suggests that better bone density moderately enhances perceived quality of life in elderly participants.

Table-4.20: Correlation Between Serum Calcium Gain Score and BMDScore Reduction

Table-4.20: Correlation Between Serum Calcium Gain Score And Bmd Reduction Score

Correlation between	Mean gain score Mean±SE	Karl pearson Correlation coefficients	Interpretation
Serum calcium gain score Vs BMD reduction score	0.41±0.07 -0.77±0.15	r= 0.39 P=0.01**	There is a significant positive fair correlation between serum calcium gain score and BMD reduction gain score. It means osteoprosis risk reduction increases their serum calcium gain score

S-Significant, NS – Not significant

Above table 4.20,The analysis shows a fair positive correlation (r = 0.39, p = 0.01) between serum calcium gain (0.41 ± 0.07) and BMD improvement (-0.77 ± 0.15), suggesting a link between better bone density and increased calcium levels.

Part-II : Section C-4.5 - Objective 5: To find out the association between selected demographic variables and osteoporosis risk reduction and quality of life among senior citizens residing in selectedold age home

Table -4.21: Association Between QOL Gain Score and Senior Citizens with Demographic Variable

Demographic variables		QOL gain score						n	F-test/t-test
		Posttest		Pretest		Post-pre			
		Mean	SD	Mean	SD	Mean	SD		
Age	65-70 years	81.52	3.36	51.99	6.74	29.53	6.39	23	F=0.96
	71-75 years	80.86	3.15	52.17	6.49	28.69	7.16	11	p=0.42(
	76-80 years	81.62	3.25	51.78	5.23	29.84	6.62	21	NS)
	81-85 years	80.38	3.39	53.43	5.84	26.95	5.33	23	
Sex	Male	80.10	3.46	55.16	7.10	24.94	8.22	6	t=1.56
	Female	81.20	3.29	52.15	5.88	29.05	6.04	72	p=0.12(NS)
Marital status	Single	80.80	3.58	51.23	5.87	29.57	5.29	13	F=0.72
	Married	81.65	4.00	46.37	1.72	35.28	2.28	2	p=0.58(
	Widowed	80.73	3.29	52.16	6.45	28.57	6.77	41	NS)
	Divorced	81.70	3.22	53.12	3.08	28.58	3.94	8	
	Separated	82.15	3.21	54.56	5.85	27.58	6.95	14	
Source of financial support	Old age pension from government	0.00	0.00	0.00	0.00	0.00	0.00	0	t=0.30 p=0.76(NS)

	Support from children	80.46	3.44	52.14	4.16	28.33	4.74	17	
	Dependent on old age home	81.30	3.25	52.45	6.43	28.85	6.66	61	
Religion	Hindu	81.12	3.25	52.30	6.17	28.82	6.41	70	F=1.03
	Christian	79.67	3.63	54.79	5.64	24.88	4.30	4	p=0.36(
	Muslim	82.55	3.97	51.50	.92	31.05	4.14	4	NS)
Previous occupation	Private	80.33	3.14	52.25	5.83	28.08	6.20	27	F=2.75
	Government	83.02	3.12	50.18	5.56	32.84	3.45	4	p=0.05*
	Self employed	81.00	4.09	45.91	3.91	35.09	1.53	5	(S)
	Nil	81.46	3.29	53.45	5.93	28.01	6.40	42	
Education status	Illiterate	81.42	3.41	54.45	5.36	26.97	5.72	34	t=2.32
	Literate	80.89	3.22	50.59	6.34	30.30	6.65	44	p=0.05* (S)
Duration of stay at old age home	Less than 1 year	80.26	3.68	53.31	5.26	26.96	4.68	13	F=3.28
	1 to 3 years	80.71	3.74	50.28	6.06	30.43	6.50	14	p=0.05*
	More than 3 years	81.45	3.07	49.73	6.11	31.72	6.53	51	(S)
Reason for joining in old age home	Voluntarily	80.75	3.36	51.77	6.58	28.98	6.02	23	F=0.02
	Brought by children	80.60	3.34	51.97	4.65	28.63	5.39	28	p=0.97 (NS)
	Others	81.98	3.12	53.34	6.75	28.64	7.44	27	
Do you have any hobbies	Yes	81.39	3.30	53.40	6.28	27.99	6.88	43	t=1.16
	No	80.79	3.29	51.14	5.43	29.65	5.38	35	p=0.25 (NS)
Do you have any co-morbid illnesses?	Yes	81.37	3.17	52.16	6.06	29.21	7.46	37	t=0.63
	No	80.89	3.42	52.59	5.98	28.30	5.00	41	p=0.53 (NS)
Do you any Intake history of Calcium/Vitamin D Supplements/Corticosteroids	Yes	81.52	3.31	53.52	7.54	28.01	8.46	18	t=0.56
	No	81.00	3.30	52.04	5.46	28.95	5.51	60	p=0.57 (NS)
Type of Dietary Pattern you follow	Vegetarian	81.05	3.17	54.43	5.13	26.61	5.27	26	t=2.16
	Nonvegetarian	81.16	3.38	51.36	6.16	29.79	6.50	52	p=0.05* (S)
Do you have any Family history of Osteoporosis	Yes	0.00	0.00	0.00	0.00	0.00	0.00	0	t=0.00
	No	81.12	3.29	52.38	5.98	28.73	6.27	78	p=1.00 (NS)
Do you have any history of Facture or Fall	Yes	81.33	3.46	52.41	6.69	28.91	7.77	11	t=0.10
									p=0.92
	No	81.09	3.29	52.38	5.91	28.70	6.06	67	(NS)

S-Significant, NS – Not significant

Above table 4.21: shows the association between QOL gain score and Demographic variables. Self employed, more than 3 years Duration of stay at old age home,

vegetarian and non vegetarian are gained more QOL score. It was assessed using oneway analysis of variance F-test and student independent t-test

Table-4.22: Association Between BMD Reduction Score Senior Citizen Demographic Variables

Demographic variables		BMD REDUCTION SCORE						n	F-test/t-test
		Posttest		Pretest		Post-pre			
		Mean	SD	Mean	SD	Mean	SD		
Age	65-70 years	-1.78	0.87	-1.21	0.84	-1.24	1.46	23	F=3.02 p=0.05*(S)
	71-75 years	-1.87	1.01	-1.31	1.15	-0.93	1.54	11	
	76-80 years	-2.09	0.85	-1.05	1.34	-0.47	0.81	21	
	81-85 years	-2.19	0.96	-1.36	1.14	-0.36	0.53	23	
Sex	Male	-2.42	0.68	-0.56	1.5	-1.87	1.94	6	t=2.15 p=0.05*(S
	Female	-1.96	0.92	-1.28	1.06	-0.68	1.24	72	
Marital status	Single	-1.7	0.84	-1.2	0.64	-0.5	1.27	13	F=0.81 p=0.52(NS)
	Married	-2.58	0.01	-0.28	1.48	-2.3	1.46	2	
	Widowed	-2.2	0.68	-1.47	1.15	-0.74	1.05	41	
	Divorced	-1.62	1.27	-0.8	1.1	-0.82	1.24	8	
	Separated	-1.8	1.25	-0.93	1.2	-0.87	2.02	14	
Source of financial support	Old age pension from government	.	.	.	.	.	.	0	t=0.34 p=0.73(NS)
	Support from children	-1.79	1.15	-0.92	1.17	-0.87	1.18	17	
	Dependent on old age home	-2.05	0.83	-1.31	1.08	-0.74	1.37	61	
Religion	Hindu	-1.96	0.95	-1.27	1.11	-0.69	1.34	70	F=1.15 p=0.32(NS)
	Christian	-2.06	0.26	-0.66	0.95	-1.4	0.76	4	
	Muslim	-2.55	0.08	-1.07	1.33	-1.48	1.29	4	
Previous occupation	Private	-1.86	0.88	-1.17	1.07	-0.69	1.24	27	F=0.33 p=0.80(NS)
	Government	-1.8	1.53	-0.73	1.47	-1.07	1.93	4	
	Self employed	-2.16	0.4	-1.85	0.67	-0.31	0.75	5	
	Nil	-2.08	0.92	-1.23	1.14	-0.85	1.4	42	
Education status	Illiterate	-2.18	0.73	-1.3	1.13	-0.88	1.05	34	t=0.65 p=0.51(NS)
	Literate	-1.85	1.01	-1.17	1.1	-0.68	1.51	44	
Duration of stay at old age home	Less than 1 year	-1.7	1.02	-0.89	1.01	-0.81	1.39	13	F=0.04 p=0.95(NS)
	1 to 3 years	-2.08	0.87	-1.23	0.87	-0.85	0.87	14	
	More than 3 years	-2.05	0.9	-1.31	1.19	-0.74	1.43	51	
Reason for joining in old age home	Voluntarily	-1.87	0.99	-1.63	0.69	-0.25	0.87	23	F=3.15 p=0.07(NS)
	Brought by children	-2.12	0.88	-0.97	1.26	-1.16	1.36	28	
	Others	-1.97	0.89	-1.16	1.16	-0.82	1.5	27	
Do you have any hobbies	Yes	-2.07	0.91	-1.2	1.12	-0.87	1.39	43	t=0.75 p=0.45(NS)
	No	-1.91	0.92	-1.26	1.11	-0.64	1.25	35	
Do you have any co-morbid illnesses?	Yes	-2.08	0.84	-1.41	1.17	-0.42	1.28	37	t=2.02 p=0.05*(S
	No	-1.92	0.97	-1.06	1.04	-0.96	1.08	41	
Do you any Intake history of Calcium/Vitamin D Supplements/Corticosteroids	Yes	-1.99	1.08	-1.15	1.23	-0.84	1.5	18	t=0.24p=0.81(NS
	No	-2	0.86	-1.25	1.08	-0.75	1.28	60	
Type of Dietary Pattern you follow	Vegetarian	-1.95	1.08	-1.44	1.3	-0.51	1.64	26	t=2.01 p=0.05*(S
	Nonvegetarian	-2.02	0.82	-0.87	0.99	-1.15	1.1	52	
Do you have any Family history of Osteoporosis	Yes	.	.	.	.	.	.	0	t=0.00 p=1.00(NS)
	No	-2	0.91	-1.23	1.11	-0.77	1.33	78	
Do you have any history of Facture or Fall	Yes	-2.03	1.18	-1.07	1.31	-0.97	1.75	11	t=0.52 p=0.60(NS)
	No	-1.99	0.97	-1.25	1.09	-0.74	1.26	67	

N-Significant, NS – Not significant

Above table 4.22,The data shows significant serum calcium gains in elderly

individuals based on specific factors. The 65-70 age group (F=3.02, p=0.05), males (t=2.15, p=0.05), those with co-morbidities (t=2.02, p=0.05), and vegetarians (t=2.01, p=0.05) showed notable gains. Other factors like marital status, education, financial support, and family history of osteoporosis showed no significant impact. Significance was set at p<0.05.

Table-4.23: Association Between Serum Calcium Gain Score and Senior Citizens Demographic Variables

Demographic variables		Serum calcium gain score						n	F-test/t-test
		Posttest		Pretest		Post-pre			
		Mean	SD	Mean	SD	Mean	SD		
Age	65-70 years	-1.78	0.87	-1.21	0.84	-1.24	1.46	23	**F=3.02 p=0.05*(S)**
	71-75 years	-1.87	1.01	-1.31	1.15	-0.93	1.54	11	
	76-80 years	-2.09	0.85	-1.05	1.34	-0.47	0.81	21	
	81-85 years	-2.19	0.96	-1.36	1.14	-0.36	0.53	23	
Sex	Male	-2.42	0.68	-0.56	1.5	-1.87	1.94	6	**t=2.15 p=0.05*(S)**
	Female	-1.96	0.92	-1.28	1.06	-0.68	1.24	72	
Marital status	Single	-1.7	0.84	-1.2	0.64	-0.5	1.27	13	F=0.81 p=0.52(NS)
	Married	-2.58	0.01	-0.28	1.48	-2.3	1.46	2	
	Widowed	-2.2	0.68	-1.47	1.15	-0.74	1.05	41	
	Divorced	-1.62	1.27	-0.8	1.1	-0.82	1.24	8	
	Separated	-1.8	1.25	-0.93	1.2	-0.87	2.02	14	
Source of financial support	Old age pension from government	.	.	.	.	.	.	0	t=0.34 p=0.73(NS)
	Support from children	-1.79	1.15	-0.92	1.17	-0.87	1.18	17	
	Dependent on old age home	-2.05	0.83	-1.31	1.08	-0.74	1.37	61	
Religion	Hindu	-1.96	0.95	-1.27	1.11	-0.69	1.34	70	F=1.15 p=0.32(NS)
	Christian	-2.06	0.26	-0.66	0.95	-1.4	0.76	4	
	Muslim	-2.55	0.08	-1.07	1.33	-1.48	1.29	4	
Previous occupation	Private	-1.86	0.88	-1.17	1.07	-0.69	1.24	27	F=0.33 p=0.80(NS)
	Government	-1.8	1.53	-0.73	1.47	-1.07	1.93	4	
	Self employed	-2.16	0.4	-1.85	0.67	-0.31	0.75	5	
	Nil	-2.08	0.92	-1.23	1.14	-0.85	1.4	42	
Education status	Illiterate	-2.18	0.73	-1.3	1.13	-0.88	1.05	34	t=0.65 p=0.51(NS)
	Literate	-1.85	1.01	-1.17	1.1	-0.68	1.51	44	
Duration of stay at old age home	Less than 1 year	-1.7	1.02	-0.89	1.01	-0.81	1.39	13	F=0.04 p=0.95(NS)
	1 to 3 years	-2.08	0.87	-1.23	0.87	-0.85	0.87	14	
	More than 3 years	-2.05	0.9	-1.31	1.19	-0.74	1.43	51	
Reason for joining in old age home	Voluntarily	-1.87	0.99	-1.63	0.69	-0.25	0.87	23	F=3.15 p=0.07(NS)
	Brought by children	-2.12	0.88	-0.97	1.26	-1.16	1.36	28	
	Others	-1.97	0.89	-1.16	1.16	-0.82	1.5	27	
Do you have any hobbies	Yes	-2.07	0.91	-1.2	1.12	-0.87	1.39	43	t=0.75 p=0.45(NS)
	No	-1.91	0.92	-1.26	1.11	-0.64	1.25	35	
Do you have any co-morbid illnesses?	Yes	-2.08	0.84	-1.41	1.17	-0.42	1.28	37	**t=2.02 p=0.05*(S)**
	No	-1.92	0.97	-1.06	1.04	-0.96	1.08	41	
Do you any Intake history of Calcium/Vitamin D	Yes	-1.99	1.08	-1.15	1.23	-0.84	1.5	18	t=0.24p=0.81(NS)
	No	-2	0.86	-1.25	1.08	-0.75	1.28	60	
Type of Dietary Pattern you follow	Vegetarian	-1.95	1.08	-1.44	1.3	-0.51	1.64	26	**t=2.01 p=0.05*(S)**
	Non Vegetarian	-2.02	0.82	-0.87	0.99	-1.15	1.1	52	
Do you have any Family history of Osteoporosis	Yes	.	.	.	.	.	.	0	t=0.00 p=1.00(NS)
	No	-2	0.91	-1.23	1.11	-0.77	1.33	78	
Do you have any history of Facture or Fall	Yes	-2.03	1.18	-1.07	1.31	-0.97	1.75	11	t=0.52 p=0.60(NS)
	No	-1.99	0.87	-1.25	1.08	-0.74	1.26	67	

Above table 4.23,The study found significant serum calcium gains in the 65-70 age group (F=2.86, p=0.05), those with co-morbidities (t=2.02, p=0.05), vegetarians (t=2.02, p=0.05), and individuals with fracture/fall history (t=2.29, p=0.05). Other factors like sex, marital status, financial support, religion, education, and stay duration showed no significant differences. Significance was set at $p<0.05$.

Part-II : Section D-4.6 - Objective 6: To assess the satisfaction level among senior citizens residing in selected old age homes after implementing the Nursing Intervention Package

Table-4.24: Each Statement Wise Level Of Satisfaction Score

Statements	Level		Number of senior	%
I 3 How helpful was your therapist in helping you I achieve your treatment goals?	I b)	Helpful	8	10.26%
	I c)	Neutral	2	2.56%
	I d)	Unhelpful	0	0.00%
	I e)	Very Unhelpful	0	0.00%
I 4. How comfortable did you feel during your therapy I sessions?	I a)	Very Comfortable	70	89.74%
	I b)	Comfortable	5	6.41%
	I c)	Neutral	3	3.85%
	d)	Uncomfortable	0	0.00%
	e)	VeryUncomfortable	0	0.00%
5. How would you rate the scheduling process for your therapy sessions?	a)	Excellent	63	80.77%
	b)	Satisfactory	12	15.38%
	c)	Average	3	3.85%
	d)	Below Average	0	0.00%
	e)	Unsatisfactory	0	0.00%
6. Was the treatment environment conducive to yourprogress?	a)	Strongly Agree	68	87.18%
	b)	Agree	8	10.26%
	c)	Neutral	2	2.56%
	d)	Disagree	0	0.00%
	e)	Strongly Disagree	0	0.00%
7. How responsive was your therapist to your communications (e.g., follow-up calls, random phone calls)?	a)	Very Responsive	66	84.62%
	b)	Responsive	9	11.54%
	c)	Neutral	3	3.85%
	d)	Unresponsive	0	0.00%
	e)	Very Unresponsive	0	0.00%
8. Did you feel supported by your therapist outside of sessions (e.g., provided	a)	Strongly Agree	60	76.92%
	b)	Agree	14	17.95%
	c)	Neutral	4	5.13%

resources, answered questions)?	d)	Disagree	0	0.00%
	e)	Strongly Disagree	0	0.00%
9. To what extent has the treatment helped you manage your issues?	a)	Very Much	65	83.33%
	b)	Significantly	10	12.82%
	c)	Moderately	3	3.85%
	d)	Slightly	0	0.00%
	e)	Not at All	0	0.00%
10. Would you recommend this treatment to others?	a)	Definitely Yes	63	80.77%
	b)	Probably Yes	11	14.10%
	d)	Uncertain	4	5.13%
	e)	Probably Not	0	0.00%
	f)	Definitely Not	0	0.00%

Above Table 4.24, the survey indicates high senior satisfaction with therapy. Most (88.46%) were very satisfied, with 89.74% praising the therapist's understanding and 87.18% finding them helpful. Comfort was rated highly (89.74%), scheduling (80.77%), and communication (84.62%). Support outside sessions (76.92%) and treatment effectiveness (83.33%) were also noted. Overall, 80.77% would recommend the therapy, reflecting strong satisfaction.

Table-4.25: Level Of Satisfaction

Level of satisfaction score	SENIOR CITIZENS	
	n	%
Poor	0	0.00%
Modrate	5	8.97%
Good	73	91.03%
Total	78	100.00%

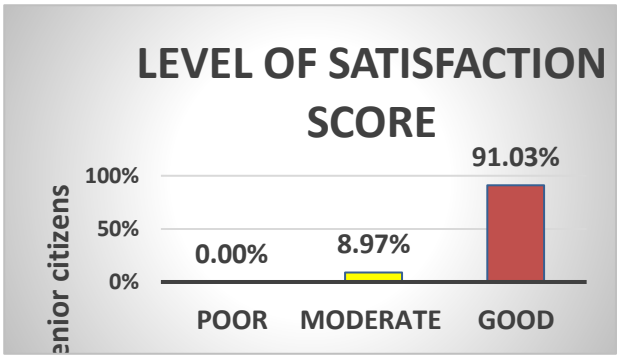


Fig 4.6: Level Of Satisfaction among Seniors Citizens

Above table 4.25,The survey shows high treatment satisfaction among seniors citizens , with 91.03% rating it as good. Only 8.97% felt it was moderate, and none reported poor satisfaction. These results highlight the therapy's success in meeting participants' needs and improving their health outcomes.

Table-4.26:Each Statement-Wise Percentage of Satisfaction Score

Statements	Satisfaction score			
	Maximum score	Mean score	SD	% of mean score
1.Overall Satisfaction with Treatment	5	4.86	0.42	97.20%
2.How do you rate your therapist's ability to understand your concerns?	5	4.87	0.41	97.40%
3.How helpful was your therapist in helping you achieve your treatment goals?	5	4.85	0.43	97.00%
4.How helpful was your therapist in helping you achieve your treatment goals?	5	4.86	0.45	97.20%
5.How helpful was your therapist in helping you achieve your treatment goals?	5	4.77	0.51	95.40%
6.How comfortable did you feel during your therapy sessions?	5	4.85	0.43	97.00%
7.How would you rate the scheduling process for your therapy sessions?	5	4.81	0.49	96.20%
8.Was the treatment environment conducive to your progress?	5	4.72	0.56	94.40%
9.How responsive was your therapist to your communications (e.g., follow-up calls, random phone calls)?	5	4.79	0.49	95.80%
10.Did you feel supported by your therapist outside of sessions (e.g., provided resources, answered questions)?	5	4.76	0.54	95.20%
Total	50	48.13	2.13	96.26%

Above table 4.26,Senior citizens reported high satisfaction (4.86/5, 97.20%). Therapy understanding and helpfulness scored 4.87 (97.40%), comfort 4.85 (97.00%), and scheduling 4.81 (96.20%).The overall mean was 48.13/50 (96.26%), indicating strong satisfaction and effectiveness.

4.5: Summary : This chapter presents key findings and discussions, using descriptive and inferential statistics to analyze data per study objectives. The results highlight variable relationships, enhancing understanding of the research topic.

CHAPTER-V
DISCUSSION

This chapter presents the major findings of the study and compares them with similar research. The primary aim was to evaluate the effectiveness of a Nursing Intervention Package (NIP) on osteoporosis risk reduction, quality of life (QOL), and biochemical parameters among senior citizens.

5.1:Major Findings and Discussion

This study evaluated the effectiveness of a Nursing Intervention Package (NIP) on reducing osteoporosis risk, improving quality of life (QOL), and enhancing biochemical parameters among senior citizens in old age homes[2].

1. To assess the level of osteoporosis risk and quality of life among senior citizens residing in selected old age homes before and after implementing Nursing Interventional package.

The QoL improved significantly post-intervention, with an overall gain of 29.04% [3]. Domain-wise improvements included physical (29.22%), psychological (35.42%), social (29.67%), and environmental (29.62%) domains [4]. These findings align with similar studies showing enhanced QoL and bone health through nursing interventions [5].

2.To evaluate the effectiveness of Nursing interventional package on osteoporosis risk reduction and related biochemical parameter and quality of life among senior citizens

Serum calcium levels increased by 0.71, with 84.62% achieving normal levels. Bone Mineral Density (BMD) improved significantly, with normal BMD rising to 32.05% post-intervention and osteoporosis cases dropping from 44.87% to 23.08% [7]. The findings support previous studies showing that targeted interventions improve bone health [8].

3.To estimate the prevalence of osteoporosis risk among senior citizens residing in selected old age home.

Before the intervention, 47.44% had osteopenia, and 44.87% had osteoporosis [9]. These results are consistent with studies indicating high osteoporosis prevalence in elderly populations, especially among women and older age groups [10].

4.To find out the correlation between osteoporosis risk reduction and quality of life among senior citizens.

A moderate positive correlation was found between QoL improvements and BMD reduction [11]. Serum calcium gain also showed a fair positive correlation with BMD, confirming that better bone health improves QoL[12].

5.To find out the association between selected demographic variables and osteoporosis risk reduction and quality of life among senior citizens residing in selected old age home

Better QoL and greater BMD gains were observed in males, self-employed individuals, and non-vegetarians [13]. Higher serum calcium levels were found in younger seniors, those without comorbidities, and those with no fracture history, showing demographic factors influence health outcomes[14.]

6.To assess the satisfaction level among senior citizens residing in selected old age homes after implementing the Nursing Intervention Package.

A high satisfaction level of 96.25% was reported, with most participants expressing good satisfaction 15. This aligns with studies emphasizing the role of personalized care and communication in improving satisfaction in elderly care settings[16.]

Summary:

This chapter highlights significant improvements in QOL, bone health, and biochemical parameters post-intervention [17]. The findings demonstrate the effectiveness of nursing interventions in elderly care and align with existing research on improving health outcomes in this population[18].

CHAPTER VI

SUMMARY, CONCLUSION, IMPLICATIONS, LIMITATIONS, CHALLENGES AND RECOMMENDATIONS

This chapter presents a summary, conclusion, implications, limitations, and recommendations of the study. It also outlines implications for nursing practice, education, administration, research, and future recommendations[19].

6.1 Summary

The study assessed the effectiveness of a Nursing Intervention Package (NIP) on osteoporosis risk reduction, quality of life (QoL), and biochemical parameters among senior citizens in old age homes in Chennai [20]. It involved 80 participants aged 65-85, selected using multi-stage cluster and random sampling [21]. The study utilized a one-group pre-test and post-test design [22]. Descriptive statistics, correlation coefficients, paired 't' tests, and ANOVA were used for data analysis [23]. Results showed that 47.44% had osteopenia and 44.87% had osteoporosis [24]. Post-intervention, QoL improved by 29.04%, with domain-specific gains in physical, psychological, social, and environmental health. Serum calcium levels increased by 0.71, with 84.62% of participants reaching normal levels, and BMD improved by -0.77. Greater improvements were observed among specific demographic groups, and 96.25% of participants expressed high satisfaction with the program.

6.2 Conclusion

The NIP, which included Tai Chi, aerobic exercises, and deep breathing, significantly improved QoL, bone density, and serum calcium levels among elderly participants. The study demonstrated that personalized exercise programs could enhance physical and mental well-being, providing a practical model for elderly care

6.3 Implications

Nursing Education: Include exercise-based interventions like Taichi and aerobic exercises in geriatric care curricula. Train students on holistic care approaches and monitoring bone health.

Nursing Practice: Integrate exercise routines into daily elderly care. Implement regular monitoring of BMD and serum calcium to prevent falls and fractures.

Nursing Administration: Develop policies to include exercise programs in elderly care. Ensure staff training and allocate resources for exercise interventions.

Nursing Research: Conduct further studies on long-term impacts of exercise interventions and explore personalized NIPs for different groups.

6.4 Limitations : The study used self-reported measures prone to bias, and participants' awareness of being observed may have influenced results. Adherence to the intervention varied, and findings may not be generalizable to other regions or populations with different health profiles.

6.5 Recommendations; Integrate Tai Chi and aerobic exercises into daily routines for elderly care. Adopt holistic care approaches combining physical activity, nutrition, and mental health support. Organize awareness campaigns on NIP benefits.

6.6 Strengths : The study used objective tests like serum calcium and BMD monitoring, conducted detailed domain-wise analysis, and achieved a high satisfaction rate of 96.25%. The favorable environment and participants' adherence contributed to the study's success.

6.7 Summary : This chapter summarizes the study's findings, conclusions, nursing implications, limitations, and future research recommendations. It highlights the positive impact of NIP on elderly care, emphasizing its feasibility and benefits for senior well-being.

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